Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Sections of a Lab Report**

There are several ways to complete a proper scientific lab report. However, they all have the same basic components. You will be asked to use the following structure for your lab reports, being sure to include all of the described items in each section. This does not mean that you may not be asked to alter the structure for other instructors. By the time you are professional scientists, you will know what structure works for you and make sure that all the essentials are included.

Before beginning a description of what should be included in a scientific lab report, there are a few vocabulary words that should be clarified. The **independent variable** is the aspect of the experiment that is being tested. It is believed that the independent variable will influence the dependent variable. It is essential that the independent variable remain constant throughout the testing process. The independent variable is, however, what will be different in the **experimental group** versus the **control group**. The experimental group is the subjects that will receive the “treatment” or whatever the independent variable is. The control group does NOT receive “treatment.” The function of the control group is to act as a comparison to experimental group to be sure that the dependent variable is actually being influenced by the independent variable and not something unaccounted for in the experiment. It is anticipated that the **dependent variable** is influenced by theindependent variable. The dependent variable is also what is being measured. Factors that affect the dependent variable that were not accounted for in the experimental set-up are called **confounding variables**. Confounding variables can be extraneous environmental factors that were not considered, unpredicted circumstances during the experiment or any other factors not included in the procedure.

**Abstract:** The abstract is a summary of the actual lab report. It is like a preview. Its purpose is to help readers decide if they are interested in reading the entire report. The abstract includes the **hypothesis**, the most prominent data collected and conclusions based on that data. The hypothesis is a statement of what the scientist predicted would happen in the experiment and will always include the **independent and dependent variables**. The conclusions should be a brief statement about what the results have taught us and how this information can be used in an applicable way. The abstract is generally only a paragraph or at least much shorter than the actual lab report.

**Title:** The title should be one line. It should include the independent and dependent variables. It should be concise, but provide exact information about what is contained in the lab report. The title should not be artsy or poetic, but rather informative. The “attention getting” aspect of a title in creative writing is less important in science than conveying the information. A good title is straightforward and uses keywords that researchers in a particular field will recognize.

**Hypothesis:** The **hypothesis** should be a one sentence statement of prediction of what is expected to occur in the experiment. It does not provide explanation. The hypothesis should include a comparison of the independent and dependent variables. The hypothesis is often written in an “if…then” format. So, in general terms, “if the independent variable is this, then the dependent variable will be this.” In a more specific example, “if more salt is added to the water then more freshwater fish will die.”

**Introduction:** The introduction, as the name implies, introduces the reader to the topic of the experiment. Often the hypothesis is simply included in the introduction, rather than being its own section. However, for this class, your hypothesis should be overly explicit, so you are being asked to make a section just for the hypothesis. Often the introduction is begun with the question that is being asked and what led the scientist to ask that question. This can include a description of previous research related to the topic. This description will also provide a context for why this experiment is important, such as what it will add or build on that has already been determined. All external sources should be cited appropriately using APA (American Psychological Association) format. This will be different from your English papers. Help with citing sources properly can be found at <http://www.noodletools.com/overview/citing/>. The introduction should outline the scientific purpose for the experiment. This is often supported by a description of the history of the topic, which may include references to other experiments or a review of the literature and observations of nature. Care should be taken to only include background information that is relevant to the current experiment.

A good introduction will answer the following questions.

Why is the study being performed?

What knowledge already exists about the subject?

What is the specific purpose of the study?

**Materials:** The materials section should be a list of all items used in the experiment including scientific pieces of equipment and non-scientific items. It is typically written as a bulleted or numerical list. The list should be complete enough that if someone wanted to replicate the experiment, and had all the items on the list, it would be possible. Think of this section as the ingredients in a recipe.

**Procedure:** The procedure isoften written as a numerical list of specific steps. It can also be written as a paragraph. For this class, it will generally be easier to compose it as a list. Should the reader want to replicate the assignment, it should be possible from the steps in the procedure. It is a good idea to describe one step at a time, even an activity that seem tiny. It should be assumed that the reader has little scientific knowledge of the topic. Therefore, being descriptive is important.

**Data:** This section will be the messy section of the report. This section is where you record data gathered during the experiment as it is being provided. However, it is a good idea to have charts or other means of organizing the data prepared ahead of time. Therefore, as long as it is organized and makes sense to the experimenter, it is done correctly. This section is not generally geared towards the reader. Although, often later scientists like to look at data sections to see if alternative interpretations are possible. It should be noted that anything that could not be collected in the moment, such as graphs, or other interpretations of the data should **not** be included in the data section.

**Results:** The results section is where the interpretation of the data occurs. Graphs, and other visuals representing the data should be included here. However, what the results mean or conclusions should still not be drawn until the following section. Think of this section as an organization of the data that is presentable for the reader since the data section typically is not.

**Conclusion:** The conclusion is where the experimenter provides the “upshot” of the experiment. The experimenter should determine if the hypothesis was supported or unsupported. This should be connected to the results. In other words, what did the results show that led the experimenter to make this determination.

Next, the conclusion should discuss what the support or lack of support of the hypothesis means for the question being asked. For example, has it been definitively demonstrated that the hypothesis was not accurate? If so, why not? Given the new information, what other hypotheses might be more accurate? This is where the experimenter should talk about possible errors in the procedure, things that went wrong or possible **confounding variables.** Please remember that an experiment where the hypothesis is not supported, is not a waste. Most of the time negative results still provide useful information.

If the hypothesis were supported, what knowledge does that contribute to the overall scientific information base? How might this new information be applied in a useful way? The experimenter may want to mention how this experiment could be improved or future experiments that could be performed which may contribute even more knowledge to the scientific information base. Not only should the conclusions relate back to the results, but it should also be connected to the research initially introduced in the introduction.